1-1-1971

ITPA as a diagnostic instrument leading to remediation

Joanne Whalen

THE ITPA AS
A DIAGNOSTIC INSTRUMENT
LEADING TO REMEDIATION

by

Sister Joanne Whalen
Daughter of Charity

A RESEARCH PAPER

SUBMITTED IN PARTIAL FULFILLMENT OF THE

REQUIREMENTS FOR THE DEGREE OF

MASTER OF ARTS IN EDUCATION

(EDUCATION OF MENTALLY HANDICAPPED)

AT THE CARDINAL STRITCH COLLEGE

Milwaukee, Wisconsin

1971

This research paper has been
approved for the Graduate Committee
of the Cardinal Stritch College by

Sister Joanne Marie Kilcahan
(Adviser)

Date Feb 20, 1971

CONTENTS

CHAPTER I

INTRODUCTION

Traditionally, general intelligence tests are used for intellectual assessment and educational placement. While these tests, i.e. WISC and Stanford-Binet, represent a sophisticated level of psychological and educational data, they do not contribute substantially to educational planning--specifically what and how to teach the child--now.

The learning theories postulated by Piaget,[1] Guilford,[2] Osgood[3] and others supported the rise of individual instruction. Generally their propositions state that the full range of cognitive abilities develop predictably in the process of intellectual maturation. On this premise the educator can provide the child with experiences appropriate to his level of development, using already acquired skills and their components in the developmental sequencing of the expected abilities and thus minimizing the difficulty in transfer to more complex skills.

With the multifactored view of intelligence, the impetus was placed on diagnostic instruments measuring specific abilities such as language,

---

[1] J. Piaget, The Origins of Intelligence in Children (New York: W. W. Norton, 1963), pp. 1-20.

[2] Mary N. Meeker, The Structure of Intellect (Columbus, Ohio: Charles E. Merrill, 1969), pp. 3-12.

[3] C. E. Osgood, Contemporary Approaches to Cognition, A Behavioristic Analysis (Cambridge, Massachusetts: Harvard University Press, 1957), pp. 76-77.

concepts and motor functioning. Simultaneously a new classification emerged designated as "learning disabilities". Learning disabilities is a global term characteristic of several fields of educationally, culturally, psychologically, and neurologically impaired children.

An institute for advanced study given at Northwestern University in 1967, formulated a comprehensive definition of learning disabilities. It includes the following:

> Learning disability refers to one or more significant deficits in essential learning processes requiring special educational techniques for remediation. Children with learning disability generally demonstrate a discrepancy between expected and actual achievement in one or more areas, such as spoken, read, or written language, mathematics, and spatial orientation. The learning disability referred to is not primarily the result of sensory, motor, or emotional handicap or lack of opportunity to learn.
>
> Significant deficits are defined in terms of accepted diagnostic procedures in education and psychology.
>
> Essential learning processes are those currently referred to in behavioral science as involving perception, integration, and expression, either verbal or nonverbal.
>
> Special education techniques for remediation refers to educational planning based on the diagnostic procedures and results.[1]

For further clarification, Bateman proposed a three-dimensional view of learning disabilities:

1. The type of problem--reading (dyslexia) and other academic subject disorders, verbal communication problems, or visuomotor integration disabilities (with appreciable overlap among categories);

2. The orientation in regard to focus on etiology, diagnosis, or remediation;

---

[1]Corrine E. Kass, "Learning Disabilities," Review of Educational Research, XXXIX (February, 1969), p. 71.

3. The professional stance--educational, psychological, or medical.[1]

The "learning disability" approach in education has been to study the individual child, to test in order to find his deficiences, to evaluate discrepancies in learning and then plan a teaching program on the basis of the diagnosis. This diagnostic-remedial approach is limited to the child's behaverial characteristics rather than etiological factors, as they are more useful to teachers in planning remedial methods.

More recent approaches have shifted the emphasis of analytic attention from the child to the learning task. Task analysis defines and examines specific tasks to be learned and prescribes how to teach these tasks in a sequential manner, always subject to what works best for the child. Remedialdiagnosis emphasizes observation of behavior over test results to determine relevant behavior in the learning milieu. Several alternative teaching methods are then tried out as the basis for selection of the optimal method for a given child.[2]

The diagnostic-remedial approach has been criticized for a variety of reasons. The question has been raised whether differential remediation should be directed to the strengths or to the deficits. Engelmann espouses remediation of the single academic deficiency directly.[3] Improvement in behaverial deficits does not necessarily

---

[1]Barbara Bateman, "Learning Disabilities--Yesterday, Today and Tomorrow," Exceptional Children, XXXI (December, 1964), p. 169.

[2]K. E. Berry, Remedialdiagnosis (San Rafael, California: Dimensions Publishing Co., 1968), pp. 8-21.

[3]S. Engelmann, Preventing Failure in the Primary Grades (Chicago: Science Research Associates, Inc.,1969), p. 6.

lead to improvement in academic behavior. Mann claims the diagnostic-remedial approach treats the separable aspects of the child's growth and development on the basis of fractional tests, i.e., Frostig, ITPA, and at the risk of violating the "whole" child concept.[1]

Many diagnostic tests, derived from learning models, implied a course of remediation. Other tests were developed with accompanying treatment programs. The ITPA was constructed on Charles Osgood's model of the communication process. As a diagnostic instrument, it deals broadly with psychological and linguistic functions. Kephart, Wepman, Engelmann[2] among others have designed diagnostic tests that assess more specific psycholinguistic abilities and disabilities.

The term "Psycholinguistic" is defined as the combination of both linguistic and psychological knowledge into a new set of methods for studying the acquisition of speech and language in the human organism.[3] In the ITPA this term refers to the basic abilities fundamental to appropriate language usage.

Statement of the Problem

The purpose of this investigation was to determine how effective the Illinois Test of Psycholinguistic Abilities (ITPA) is as a diagnostic instrument leading to remediation of psycholinguistic deficits in

---

[1] L. Mann, "Are We Fractionating Too Much?" Academic Therapy, V (Winter, 1969-70), p. 88.

[2] E. G. Roach & N. C. Kephart, Purdue Perceptual-Motor Survey (Columbus, Ohio: Charles Merrill, 1966); J. M. Wepman, Auditory Discrimination Test (Chicago: J. M. Wepman, 950 E. 59th Street, 1958); S. Engelmann, Basic Concept Inventory (Chicago, Illinois: Follett, 1967).

[3] Jean Berko and R. Brown, "Psycholinguistic Research Methods", Handbook of Research Methods in Child Development, ed. by P. Mussen (New York: John Wiley & Sons, 1960), p. 517.

children and the programming for scholastic success.

The questions this study intended to be explored through a review of the research were:

1. Is it possible to correct or remediate deficit areas indicated by the ITPA through direct educational intervention?
2. Can the educator make better educational decisions and programs based on the results of the ITPA?

Description of the ITPA

The ITPA was designed as a diagnostic tool to identify psycholinguistic strengths and weaknesses in children--ages two and one-half to nine years. It was standardized on a population of 700 children within the limits of normal intelligence. The theoretical basis of this test is described in detail by Kirk and McCarthy.[1]

The 1961 Experimental Edition of the ITPA model has a three-dimensional structure comprising a battery of nine subtests. The first dimension involves four channels of communication; auditory and visual stimuli--vocal and motor responses. The second dimension measures the degree of organizational ability developed within an individual on two levels; the representational level requires more comprehension and manipulation of language symbols while the automatic level depends more on predictive and memory sequences, and automatic habit chains. The third dimension involves the psycholinguistic processes of reception, expression and association or the internal

---

[1] S. A. Kirk and J. J. McCarthy, "The Illinois Test of Psycholinguistic Abilities--An Approach to Differential Diagnosis", American Journal of Mental Deficiency, LXVI (November, 1961) pp. 399-412.

manipulation of percepts, concepts, and linguistic symbols.

The 1968 Revised Edition of the ITPA has added a Visual Closure subtest (at the automatic level) and two supplementary subtests (Auditory Closure and Sound Blending). The names of the subtests have been changed but the psycholinguistic abilities measured are the same.

1961 Experimental Edition--1968 Revised Edition

Tests at the Representational Level:

1 Auditory Decoding--Auditory Reception; the ability to comprehend the spoken word.

2 Visual Decoding--Visual Reception; the ability to comprehend pictures and written words.

3 Auditory Vocal Association--Auditory Association; the ability to relate concepts presented orally.

4 Visual Motor Association--Visual Association; the ability to relate concepts presented visually.

5 Vocal Encoding--Verbal Expression; the ability to describe objects vocally.

6 Motor Encoding--Manual Expression; the ability to express ideas through gestures.

Tests at the Automatic Level:

7 Auditory Vocal Automatic--Grammatic Closure; the ability to use appropriate inflected endings in acquiring automatic habits of speech.

No test, 1961 Edition--Visual Closure; the ability to identify a common object from an incomplete visual presentation.

8 Auditory Vocal Sequential--Auditory Sequential Memory; the ability to repeat correctly a sequence of digits.

9 Visual Motor Sequential--Visual Sequential Memory; the ability to reproduce sequences of nonmeaningful figures from memory.

Supplementary Tests:

Auditory Closure; the ability to fill in the missing

parts which were deleted in auditory presentation and to produce a complete word.

Sound Blending; the ability to synthesize the separate parts of the word and produce an integrated whole.[1]

The Limitations and Significance of the Study

This study was initiated to compile the available and relevant research on the ITPA for a better understanding of the diagnostic-remedial approach--its strengths and weaknesses. Only those investigations were reviewed that deal with special abilities and disabilities of different exceptionality groups and the effects of remediation. Although the majority of studies were based on the 1961 Experimental Edition, the results are expressed in the simplified terminology of the 1968 Revised Edition.

It is hoped that new directions are open to better understand and serve the special child as a result of this review.

---

[1] J. N. Paraskevopoulos and S. A. Kirk, The Development and Psychometric Characteristics of the Revised Illinois Test of Psycholinguistic Abilities (Urbana: University of Illinois Press, 1969), pp. 11-24.

CHAPTER II

REVIEW OF THE LITERATURE

Many different types of exceptional children have been the subjects for research projects using the ITPA. Bateman did a summary of studies up to June, 1965, under the categorical headings of Statistical, Remediation and Language Disorder Studies.[1] In 1968, Kirk briefly reviewed selected studies on the psycholinguistic characteristics of different groups of children, i.e. special reading disabilities, speech disorders, mentally retarded, and disadvantaged children.[2] No known review of ITPA studies has been published since then.

Semmel and Mueller did a factor analytic study resulting in a high degree of uniqueness in each subtest.[3] Some current studies have questioned this "single abilities" factor, e. g. Weener et al.,[4] Ryckman

---

[1]Barbara Bateman, The Illinois Test of Psycholinguistic Abilities in Current Research (Urbana, Illinois: Institute of Research on Exceptional Children, University of Illinois, 1965)

[2]S. A. Kirk, "ITPA: It's Origin and Implications", Learning Disorders, Vol. III, ed. by J. Hellmuth (Seattle, Washington: Special Child Publication, 1968), pp. 397-427.

[3]Bateman, Research Summaries, p. 1.

[4]P. Weener, L. S. Barritt, and M. I. Semmel, "A Critical Evaluation of the Illinois Test of Psycholinguistic Abilities", Exceptional Children, February, 1967, pp. 373-380.

and Wiegerink.[1] Some have made comparison analysis between the ITPA and other language tests or general intelligence tests, e.g. Horner,[2] Hirshoren.[3] Mittler's study considers the possible contribution of genetic factors to specific psycholinguistic abilities.[4]

The research reviewed in this study is primarily concerned with:

1. exploring qualitative differences in performance on the ITPA by children of different exceptionalities and intellectual functioning;
   a. qualitative differences in ability, and
   b. predictive differences in between groups, particularly reading.
2. Investigations using the ITPA as a diagnostic tool for measuring the effects of remediation;
   a. direct remediation of specific psycholinguistic disabilities through specific remedial training, or
   b. a developmental program of remediation generally related to communication disorders.

---

[1] D. B. Ryckman and R. Wiegerink, "The Factors of the ITPA: A Comparison of 18 Factor Analyses", Exceptional Children, October, 1969, pp. 107-114.

[2] R. D. Horner, "A Factor Analysis Comparison of the ITPA and PLS with Mentally Retarded Children", Exceptional Children, November, 1967, pp. 183-190.

[3] A. Hirshoren, "A Comparison of the Predictive Validity of the Revised Stanford-Binet Intelligence Scale and the Illinois Test of Psycholinguistic Abilities", Exceptional Children, January, 1970, pp. 517-522.

[4] P. Mittler, "Genetic Aspects of Psycholinguistic Abilities", Journal of Child Psychology and Psychiatry, X (Great Britain: Pergamon Press, 1969), pp. 165-176.

Characteristic Performance Studies

A summary of the discrete abilities tested by the ITPA is represented in the form of a psychodiagnostic profile--a graphic picture of the differences of ability within a single child. The ITPA seems to differentiate some groups of handicapped children by characteristic patterns of strengths or weaknesses in their profiles. Interpretations of these profiles have indicated logical relationships between linguistic processes at the representational level and generally portray a superior performance at the representational level over the automatic level. The automatic level functions are strong components in initial school learning. A strong general language factor is reflected in the high correlation between MA and PLA (psycholinguistic age).[1]

Qualitative Studies

Mueller conducted an investigation comparing qualitative differences in profiles between gifted and retarded children. The subjects were divided into three groups--21 each. The gifted had Stanford-Binet IQ's of 120 or higher; the EMR children had IQ's between 50 and 80; the TMR children had IQ's between 30 and 49. All subjects were matched within six months on MA and were comparable in race and sex. As predicted, the gifted scored higher in the auditory-vocal subtests and consistently higher on the association process subtests. The EMR group functioned best in visual reception and the TMR group scored highest in manual expression. It was predicted that the MA of the mentally retarded children would be higher than their

---

[1]Bateman, Research Summaries, p. 1.

LA, while the reverse would be true for the gifted. The results showed all groups obtained a total LA score lower than the average MA, indicating a difference in language ability at different levels of intellectual functioning, independent of the MA. The magnitude of the difference between MA and LA increases as IQ decreases.[1]

Mueller and Weaver compared the language ability of institutionalised with non-institutionalised Trainable Mental Retardates. Forty pairs matched on sex, race, CA and IQ made up the research population. All subjects were tested on the ITPA and rated on speech. Contrary to expectation, the institutional TMR's had a significantly higher total LA than the non-institutional TMR's. The institutional TMR's showed greater responsiveness to the testing situation, indicating an "attention-need" variable. Their findings corroborated other studies, in that the greatest deficiencies occur at the automatic level of functioning; a preference was indicated for the visual-motor over the auditory-vocal channels and significant deficits were found in Verbal Expression. The correlations between speech ratings and MA were less than between speech and LA. The higher correlations between MA and LA support the emphasis on a general language program for TMR children in preference to speech therapy.[2]

Bilovsky and Share attempted to describe the cognitive patterns of mentally retarded children diagnosed as Down's syndrome, through

---

[1] M. W. Mueller, "Comparison of Psycholinguistic Patterns of Gifted and Retarded Children", Journal of School Psychology, III (Spring, 1965), pp. 18-25.

[2] M. Mueller and S. J. Weaver, "Psycholinguistic Abilities of Institutionalised and Non-Institutionalised Trainable Mental Retardates", American Journal of Mental Deficiency, LXVIII (January, 1964), pp. 775-783.

an assessment of their language functions. The subjects were eleven boys and thirteen girls enrolled in public school special classes for both educable and trainable retarded. The mean CA was 13-11 and the mean IQ was 46.6. No criteria group was utilized. Comparisons were done in terms of LA norms. Each subject was compared with his own LA norm, and he was ranked on the basis of his deviation on each subtest. Each subject deviated from his own norm considerably but when the group performance was ranked there was considerable agreement and less variance in the pattern of functioning for this sample. The primary deficits for this Down's syndrome group were in the auditory-vocal channels at the automatic level. The primary strengths were in the Manual Expression and Visual Reception tests. The subjects did relatively well on those abilities tested at the representational level. Within each process the auditory-vocal channels showed the greatest deficit.[1]

Glovsky compared two groups of mentally retarded children enrolled in a speech therapy program in a residential state school. The two groups differed in that the subjects of Group A were diagnosed as possible aphasic because they had no speech at an early age. Group A consisted of sixteen males and one female with a mean CA of 16-8; a mean MA of 5-59; and a mean IQ of 42.3. Group B was comprised of thirteen males and four females with a mean CA of 13-9; a mean MA of 5-6; and a mean IQ of 49.8. The ITPA was administered to determine what language areas showed differences between these groups. Group B was superior to Group A (aphasics) in all subtests that require verbal production and

---

[1]D. Bilovsky and J. Share, "ITPA and Down's Syndrome: An Exploratory Study", American Journal of Mental Deficiency, LXX (July, 1965), p. 78.

expression. An exception was in the Auditory Memory test. The A group, being echolaic, could repeat digit sequence. There was no statistical difference on subtests that do not require speech. The investigator concluded that lack of speech at an early age does not necessarily indicate aphasia.[1]

Joynt and Cambourne used the ITPA in an investigation replicating Luria's study delineating the role of speech in the levels of behavioral development. Both the Russian and Australian children showed similar characteristic relationships between their chronological development, their psycholinguistic development and the ability to regulate their own behavior and environment. The four stages of speech that resulted are:

1. LA up to 43 months--The child can respond to verbal instructions from another by both initiating and inhibiting responses.
2. LA from 43 to 51 months--The child has enough meaningful speech to direct his own motor actions.
3. LA from 54 to 64 months--The child's speech is developed to regulate his own behavior but verbalizations are not phonetically and semantically congruent.
4. LA of 65 months and up--The child has sufficient speech to regulate his behavior using silent self-administered instructions. The investigator

---

[1]L. Glovsky, "A Comparison of Two Groups of Mentally Retarded Children on the ITPA", The Training School Bulletin, (May, 1970), pp. 4-14.

concluded that early training in language will facilitate the child's control over his own behavior and environment.[1]

Mittler and Ward did a comparison study with four-year-old British children and a four-year-old American sample taken from the normative population for the 1961 edition of the ITPA. This investigation was part of the twin study done by Mittler[2] using the normal singleton control group. One hundred four-year-old nursery school children--fifty boys and fifty girls--were given the ITPA. The results approximated the American standardization sample of the same age, but a serious social class bias was observed.

> McCarthy and Kirk reported that social class did not appear to affect ITPA scores before age six, but a powerful effect can be observed in English children at 48 months. The effect is more marked in the auditory-vocal than in the visual-motor channel. This confirms the findings of a parallel study of four-year old twins, for whom the subjects in the present study acted as controls. Comparison of intrapair correlation for identical and fraternal twins suggest that between 44 and 56 percent of the variance of ITPA total scores was accounted for by genetic differences within the population; however, the influence of genetic factors was relatively more marked in the visual-motor than in the auditory-vocal channels.[3]

The individual subtests suggest that the auditory-vocal channels are more affected by social class. The girls showed a tendency toward higher language scores than boys but this was only significant in the

---

[1]D. Joynt and B. Cambourne, "Psycholinguistic Development and the Control of Behavior; Replication of A. R. Lurias' Study", British Journal of Educational Psychology, XXXVIII (November, 1968), pp 249-260.

[2]Mittler, Genetic Aspects.

[3]P. Mittler and J. Ward, "Use of the ITPA on British Four-Year-Old Children: A Normative and Factorial Study", British Journal of Educational Psychology, XL (February, 1970), p. 51.

and vocal channels of communication. The sixty-one
randomly selected from a preschool population of a
early training of culturally deprived children. The
to two experimental groups; one group had two years
perience and one group had only one year's experien
group had none. The resulting language pattern of
was strikingly similar. The two experimental groups
the control group on most of the subtests. The only
divergence was between the experimental groups in th
subtest. Although the auditory and vocal channels
lower than the visual and motor channels as predicte
score for the Verbal Expression test, contrary to ex
higher than the total ITPA mean score for each of th
The authors offer this explanation: "the lower-class
expressive ability than is generally recognized..."
was the severest deficit. LA was significantly lowe

---

[1] Ibid., pp. 43-54

[2] Mueller and Weaver, LXVIII, pp. 775-783.

predicted but there were high correlations between LA and MA for the total subjects.[1]

Lombardi compared the psycholinguistic abilities of the Papago Indians in a segregated reservation school with those going to a school integrated with other ethnic groups. The Papago Indians are the second largest tribe in Arizona and among the poorest. Using the stratified random selection, forty children were drawn from the first and third grades of each school. None were repeaters. The eighty children were given the 1968 Edition of the ITPA and compared with a normative sample from the standardization population by Paraskevopoulos and Kirk.[2] The Papago Indian children were significantly lower than the normative sample in all subtests except Visual Memory. The investigator suggests that this reflects the cultural aspect in developing psycholinguistic abilities; e.g. basket weaving takes considerable visual-motor sequencing ability. As expected, a pattern of auditory and vocal deficits reflect the limited use and experience with English grammar. In comparing the two school programs, the integrated group performed significantly better in the total psycholinguistic abilities as they progressed from first to third grades whereas the segregated group showed increased retardation in abilities as they advanced from first to third grade. This reflects the integrated groups' association with middle-class American language and people. It also implies that IQ's reflect

---

[1] S. J. Weaver and Ann Weaver, "Psycholinguistic Abilities of Culturally Deprived Negro Children", American Journal of Mental Deficiency, LXXII (July, 1967), pp. 190-197.

[2] Paraskevopoulos and Kirk, Psychometric Characteristics, pp. 50-75.

auditory-vocal channel deficits as well as limited intelligence.[1]

In summary, these studies point up a definite patterning of language abilities among low socio-economic, mentally retarded, and bi-cultural children. Common characteristics are: a better ability to use language at the representational level than at the automatic level; greater deficits concentrated in the auditory and vocal channels of communication. These language deficits are seen as independent of MA for each isolated ability but the total LA score has a high correlation with the MA. The Visual Memory subtest seems influenced by a cultural factor.

Predictive Studies

Olson explored the psycholinguistic differences of children with receptive aphasia (RA), expressive aphasia (EA), and deafness (D). A competent medical and psychological diagnosis of the particular type of handicap was required for each child. The three groups, approximately 26 each, ranged in CA from 5-0 to 9-7 and were within the limits of near normal IQ. The subjects were matched on IQ, CA, and sex with a normative sample of the ITPA; first as a total exceptional group and then by subgroups. The results in comparing the exceptional group with the normative group were: no significant difference between groups in two subtests, i.e. Visual Association and Manual Expression, but there was a significant difference in favor of the normative group on all other subtests. The greatest differences were in the auditory and

---

[1] T. P. Lombardi, "Psycholinguistic Abilities of Papago Indian School Children", Exceptional Children, XXXVI, (March, 1970), pp. 485-493.

but were inferior to the D group in Auditory Recept
Association, Verbal Expression and Grammatic Closur
deaf used their speech reading ability to interpret
stimuli. The RA group was linguistically a homogen
EA group's profile was extremely varied. The resul
indicate that the ITPA can be used to support clini
differentiating between deaf and receptive aphasic

Predictive Studies in Reading

There have been a number of research studies
the ITPA performance of children with reading disab
studies seek to find some psycholinguistic correlat
achievement or they explore the sense modalities in
method of reading instruction.

Kass attempted to discover some psychological
reading disability that were not due to inadequate

---

[1] J. L. Olson, "A Comparison of Receptive
Aphasic and Deaf Children on the ITPA", Selected St
Test of Psycholinguistic Abilities, (Institute for
Children at the University of Illinois, 1963), pp.

limited intelligence or sensory defects. The author extended the clinical model of the experimental edition of the ITPA with appropriate tests for hypothesizing the reading functions; i.e. a Visual Automatic Closure test (constructed by the author) a Sound Blending (Monroe's) test, Mazes (WISC), Memory for Design (Graham and Kendall), Perceptual Speed (Thurstone's PMA). The subjects were drawn from the second through fourth grades of a Southern Illinois public school. The twenty-one children of normal intelligence had a CA range of 7-0 to 9-11 years. The criteria for reading retardation was all children falling from one-half year to two and a half years below grade placement as measured by a diagnostic reading test. A theoretical population mean was used as the standard for comparison with the experimental group. The reading disabled group had significant deficits in Auditory Association, Visual Memory, Sound Blending, Mazes, Memory for Design, and Perceptual Speed but they were significantly strong in Visual Reception. This strength suggests that children with normal intelligence compensate by acquiring information through pictures. The disabled readers tended to have more deficiencies at the automatic level, indicating a close relationship between the automatic functions and the acquisition of reading skills. Kass suggests that:

> ...a deficiency in the brain stem may limit the symbolic storage of children with reading disabilities, and this in turn may create deficits in integrational functions, such as closure, sequential memory, and rate of recognition. The educational implication is the method of reading should stress exercises of integrative or automatic - sequential functions.[1]

---

[1]Corrine E. Kass, "Some Psychological Correlates of Severe Reading Disability (Dyslexia)", (unpublished Ph. D. dissertation, University of Illinois, 1962), p. 57.

Ragland did an investigation of the reading ability among EMR children. Two reading tests were administered to determine the disabled readers. The criterion for reading retardation was those EMR children reading one year or more below the expected reading level predicted on the basis of their MA. Those EMR children reading on a level commensurate with their MA were considered non-retarded readers. The investigator hypothesized that the ITPA measures some specific abilities that contribute to reading achievement; therefore the disabled reader would perform at a deficient level on some of these abilities. The subjects were taken from a residential school setting; divided into two groups of fifteen each with a CA between 12 and 16, an MA between 6-5 and 10-0, and a WISC IQ between 48 and 79; an attendance of at least one school year and no sensory impairment. The two groups differed only on reading achievement. The average reading grade level for the retarded readers was 1.43, for the non-retarded readers, 3.47. The disabled readers performed significantly lower than the non-disabled readers on the total ITPA, particularly at the automatic level with the greatest deficit in the Grammatic Closure test. There was no significant difference in performance at the representational level. Both groups of EMR children demonstrated a mean performance significantly below the theoretical mean for their MA.[1]

Graubard did an investigation to identify certain psycholinguistic correlates in institutionalised emotionally disturbed children. The subjects were twenty-three "acting-out" children who had been screened for psychotic and organic defects. All subjects were within the normal

---

[1]G. G. Ragland, "The Performance of Educable Mentally Handicapped Students of Differing Reading Ability on the ITPA", (unpublished Ph. D. dissertation, University of Virginia, 1964).

IQ range as measured on the WISC and were one year or more below reading grade expectancy as measured on the Metropolitan Achievement Test. The ITPA, the main instrument was supplemented by Harris' Lateral Dominance Test, Monroe's Sound Blending Test, and Mazes from the WISC. The ITPA ceiling of 9-0 years imposed limits on this study with a mean CA of 10-0. The difference between the observed sample mean and a theoretical population mean was the basis for measuring deficits. The investigator felt it was possible to predict the performance of the special group on the ITPA. He proposed ten hypotheses of which eight were confirmed. The subjects scored higher at the representational level than at the automatic level. Emotional disturbance seems to inhibit the closure and memory processes. The auditory and vocal subtests were stronger by comparison than the visual and motor subtests. The sample showed significant deficits in the Visual Association, Grammatic Closure, Visual Memory, Sound Blending, Laterality and Directionality, and the Mazes. The visual memory and association deficits are specific psycholinguistic correlates of reading disability. An educational implication would be a phonetic method for reading instruction.[1]

Bateman did an investigation of the reading ability of ninety-six partially-sighted children compared to normal-seeing children on reading achievement, psycholinguistic performance, and the relationship between both reading achievement and type of errors made and ITPA performance. The sample represented ninety percent of the total partially-seeing children enrolled in grades one through four in twenty resource rooms

---

[1]P. S. Graubard, "Psycholinguistic Correlates of Reading Disability in Disturbed Children", (unpublished Ph. D. dissertation, Yeshiva University, New York: 1965).

The number and type of errors made were not signifi
the normal population but the partially-seeing chil
vowel errors. In psycholinguistic performance, the
group as a whole did not differ from the normative
and vocal subtests with the exception of the low IQ
children who had an extreme deficit in Auditory Ass
visually handicapped showed a significant visual-mo
the mild and moderate visually handicapped showed o
ceptive deficit and no visual association deficit.
motor channel deficit for this group seems to sugge
ing central rather than peripheral processes. The
proved to be a sensitive index to the extent and li
seeing child's background of experiences. There we
correlations found between reading achievement and
reading age index. When an index of reading achiev
reading grade placement was used, a positive correl
reading achievement and the Auditory and Visual Mem
Closure. All are functions at the automatic level

author implies that "minimal sensory intake may be sufficient for near maximal central efficiency."[1]

Sutton's study as summarised by Bateman, investigates the relationship of visualising ability to reading achievement. Two groups of EMR special class children from a mid-western town were matched on MA (6-6 to 8-0); CA (8-10 to 11-12); and IQ. Mental age is frequently used to define the appropriate reading age for EMR children. Those children who scored higher than their MA expectancy on a reading achievement test formed the good readers group while those who scored lower than their MA expectancy formed the poor readers group. Six memory tests were administered individually utilising forms, letters and designs. They required the subject to reproduce sequences (Visual Memory subtest of the ITPA), recognize and copy letters and designs. The good readers scored significantly higher than the poor readers on writing letters in consonant groups and recognising letters in non-meaningful material. The good readers' performance on sequencing and the writing of forms was superior to the poor readers but not to a significant degree. No difference was found on recognising and reproducing designs. These findings suggest that the closer a task is to reading, the greater the relationship to reading ability.[2]

Wiseman comments on Sutton's study:

> The results show that the relative facility or ease in naming the symbolic memory items (such as letters) aids in the memory process of both the written and

---

[1]Barbara Bateman, "Reading and Psycholinguistic Processes of Partially-Sighted Children", (unpublished Ph. D. dissertation, University of Illinois, 1962), p. 112.

[2]Bateman, Current Research Summaries, pp. 24-25.

> recognition responses. The implication is that the relative ability to recognize and verbalize symbols might be the variable responsible for the results. Other studies have demonstrated that verbal language facility aids in visual memory ability.[1]

Hurley did an investigation of the relationship between reading and the automatic sequential level. He hypothesized that the integration defects (i. e. memory and spatial closure disabilities) will differentiate between adequate and inadequate readers. The subjects were selected from two central Illinois communities. A group intelligence test and a reading achievement test were administered. On the basis of these tests matched pairs (sex, CA, IQ) of forty adequate and forty inadequate readers were selected. A battery of tests including three tests of short-term visual memory, three tests of spatial ability, and four tests of intersensory integration were administered to each individual subject. A three-way analysis of variance (sex, towns, reading) was computed for five factors (intersensory integration of like forms, unlike forms, spatial ability, visual sequencing, and reading). The results were negative on the reading effects. The integrational defects did not adequately distinguish one group from another. There were significant differences between adequate and inadequate readers, sex and towns but each group differed on different factors. The investigator attributes these negative results to a biased sample selection. Reading ability and reading instruction differed substantially between towns; e.g. subjects were chosen from

---

[1] D. E. Wiseman, "The Effects of an Individual Remedial Program on Mentally Retarded Children with Psycholinguistic Disabilities," (unpublished Ph. D. dissertation, Department of Education, University of Illinois, 1965), p. 8.

a reading disability program in one town. Although the hypotheses were not supported, the author concludes with the significance of the teaching method:

> A salient relationship might exist between the method of teaching reading (phonic or sight) and the kind of reading problem observed. A phonic method seems to rely most heavily on sequencing memory and the discrimination of letters. Thus, children who fail to learn to read under this method would be those with poor visual memory accompanied by some inability to discriminate letters. A visual method of teaching reading, on the other hand, may place more emphasis on the ability to correctly match identical forms--the ability to recall the identical symbol from a repertoire of symbols. A teacher may serve her children best by using a combination of both methods.[1]

McLeod did a series of three experiments on the integrative functioning of visual and auditory memory and verbal reproduction--all automatic level abilities--as related to reading ability. The subjects were twenty-three second graders enrolled in the Remedial Education Center of the University of Queensland, Australia. The control and experimental groups were matched on CA and grade only but the experimental group were more than one year retarded in reading relative to their grade expectancy. The tests involved differentiating order of approximations to verbal and visual representations of the English language. The closer the representation approximates the English symbols (verbal or visual), the better the performance for both groups. The E group performance was consistently inferior to the C group. In a factor analysis of the data for predicting reading disability the most significant factor was an

---

[1] O. L. Hurley, "Perceptual Integration and Reading Problems", Exceptional Children, (November, 1968), pp. 213-214.

integrative--sequencing factor with significant loadings on the Grammatic Closure, Visual Memory, and Auditory Memory subtests. A visual-motor factor with significant loadings on the Visual Association subtest was not significant enough to predict reading retardation. Delayed speech developmentally was a recurrent phenomenon among retarded readers.[1]

Slobodzian, in a study with 115 first graders found that achieving readers (located on both informal and standardized tests) tended to score higher on the Auditory Association and Visual Reception subtests than non-achievers, but the difference was not significant. Although the correlations between total ITPA scores and the Gates Primary Paragraph Reading Test were fairly high (.78) for group performance, there was little relationship between the individual's total score on the ITPA and his reading instructional level. Non-achieving readers on individual total test results and on group total test results tended to have more negative scores and these deficits were larger than the achieving readers. The author feels that the ITPA is a good predictor of reading achievement especially in disadvantaged communities:

> Throughout the entire test, background inadequacies can be detected; differences between the level of a child's ideas and his ability to express those ideas can be ascertained; deviations in auditory and visual abilities can be located; self-confidence in language usage, or lack of it, can be evaluated; differences in hearing and speaking vocabularies can

---

[1] J. McLeod, "Some Psychological Correlates of Reading Disability in Young Children", Reading Research Quarterly, II, (1967), pp. 5-31.

be assessed; articulation problems are evident.[1]

Bruininks et al. compared the performance on the ITPA of good and poor readers from a disadvantaged background. The subjects had completed first grade and were part of an experimental reading and language-development project in the Nashville Public Schools. Eighty-four were taught by the initial teaching alphabet (i/t/a) and sixty-one were taught by the traditional orthography (Houghton-Mifflin's Reading for Meaning Series). The good readers were all children whose mean score fell above the 80th percentile on the Metropolitan Reading subtests. The poor readers' mean score fell below the 20th percentile. Both groups were equated in CA, IQ and sex. The final sample consisted of eleven good and eleven poor readers from the i/t/a program and ten good and ten poor readers from the traditional program. The total ITPA performance of poor readers under both reading programs was significantly inferior to that of the good readers. There were diverse patterns of subtest differences between good and poor readers within each reading program. The i/t/a poor readers had Auditory Reception, Association, Memory and Grammatic Closure subtest deficits. The traditional poor readers had Auditory and Visual Association subtest deficits. The results suggest that this sample of disadvantaged children have deficiencies in the auditory reception and expression processes and a grammatic closure disability. These children demonstrated a relative strength in auditory

---

[1]Evelyn B. Slobodzian, "Use of the ITPA as a Readiness Measure", in Reading Diagnosis and Evaluation, Vol. XIII, No. 4, ed. by Dorothy L. DeBoer, (Proceedings of the 13th Annual Convention International Reading Association, Newark, Delaware: 1970), p. 47.

memory.[1]

Bateman did a study for the purpose of comparing the efficacy of the auditory and visual approaches to beginning reading; both when first-grade children were grouped according to their preferred modality (auditory or visual) and when they were arbitrarily grouped.[2] Before the beginning of first grade, the subjects were given a group IQ test and a reading readiness test. There was no significant difference on IQ, MA, and total reading readiness. Four classes were given the ITPA and subjects were designated as predominantly auditory or visual learners. These subjects were placed in one of the following four subgroups: (1) an auditory learner in a class using an auditory reading method; (2) an auditory learner in a visual reading method class; (3) a visual learner in an auditory reading method class; (4) a visual learner in a visual reading method class. The four classes that did not receive the ITPA made up the non-placement group and were dispersed between four similar subgroup classes with consideration of heterogeneous groupings in sex, CA and IQ. The total eight classes differed only in the method of reading instruction. This study is limited in its interpretation because the sample was drawn from a high socio-economic level; using as criteria for "poor" readers a mean IQ of 120 and a reading grade level of 2.9 at the end of first grade. The

---

[1]R. H. Bruininks, W. G. Lucker, and R. L. Gropper, "Psycholinguistic Abilities of Good and Poor Reading Disadvantaged First Graders", Elementary School Journal, LXI, (April, 1970), pp. 378-386.

[2]Barbara Bateman, "The Efficacy of an Auditory and Visual Method of First Grade Reading Instruction with Auditory and Visual Learners", Perception and Reading, Vol. XII, Part 4, ed. by Helen K. Smith, (Proceedings of the Twelfth Annual Convention, International Reading Association, Newark, Delaware: 1969), p. 105.

"good" readers have a mean IQ of 129 and a reading level of 3.9. In comparing the results, the auditory method was significantly superior to the visual method in both placement and non-placement groups. The difference in reading achievement between the two auditory classes and the two visual classes in the non-placement group was not significant, which implies the teacher variable was not as crucial as the method employed. The good readers were predominately auditory subjects and the poor readers were predominantly visual subjects. The poor readers had a peak in Manual Expression and were below the total visual group in Visual Memory. There was little interaction between the subjects preferred modality and the method of instruction used. The author brings up the questions whether instruction should be geared to the child's pattern of cognitive strengths or to his weaknesses? From the findings she concludes:

> The data from this study suggest the answer would then be to teach to his strengths if he is an auditory learner or to his weakness if he is a visual learner...the auditory method is superior regardless of the child's own pattern of learning.[1]

On the other hand, DeHirsch believes that visual determinants are far more beneficial to good readers than auditory ones. In the reading process, good readers can go directly from the printed representation of the word to its meaning without help from the auditory or kinesthetic image.

DeHirsch states:

> We feel that exploration of modality strength and weakness is of more than theoretical interest and should largely determine teaching methods. Children

---

[1]Ibid., p. 111.

> who do well in both auditory and visual modalities will benefit from either sight or phonic techniques, but they will presumably do best with a combination. Children who perform poorly in both modalities are in need of a multiple approach; they require, in fact, activation of as many learning pathways as possible, including kinesthetic and motor ones. Youngsters who have severe visual perceptual deficits but who are good auditors require heavy emphasis on phonics which will enable them to compensate for their shortcomings in the visual realm by means of their auditory competency. In our opinion, one method of teaching cannot be favored over another as a matter of principle. Approaches to teaching should depend on the individual child's strength and weaknesses in the different modalities.[1]

In summary, the psycholinguistic abilities at the automatic level correlate closely with reading ability. Most of the studies agree that reading achievement is positively related to the memory and closure processes. Poor readers were generally strong in the visual-motor process with the exception of the emotionally disturbed who showed a pattern of visual-motor disability. Good readers generally prefer the auditory approach to reading. Verbal language may be an underlying component in the visualising process of reading. Peripheral sensory impairment does not necessarily limit psycholinguistic functions.

Remedial Treatment Studies

The remedial program has two major aspects: the method and the composition. The generally accepted methods of remediation are: (1) a broad developmental approach to treatment of all areas of disability

---

[1]Katrina DeHirsch, Jeannette Jansky, and W. S. Langford, Predicting Reading Failures, (New York: Harper Row Publishers, 1966), p. 83.

without emphasis; (2) a specific approach to differential treatment aimed at one or more specific abilities; (3) a combination of general development and specific disabilities treatment. The choice of remedial approach may determine the composition, i.e. individual or group instruction. Group instruction may take the form of small groups, large groups, homogeneous or heterogeneous ability grouping. The "time" factor is an important variable in planning remediation.

Studies Utilising the Direct Remedial Approach

Bateman summarised Hermann's investigation of the psycholinguistic functions of three mentally retarded siblings in a family with a four generation history of mental deficiency. The three siblings showed similar ITPA profile patterns with strengths found mainly in the visual-motor channels and weaknesses in the auditory-vocal channels. One of the siblings received direct remedial training in Grammatic Closure with another subject, also an eight year old female from a different family serving as her own control. The treatment extended over a period of three months. The two siblings that did not receive remediation made significant gains in some psycholinguistic areas and their ITPA profiles became more similar. The two children who did receive remediation made significant gains in the deficit area, approximately three years LA gain in Grammatic Closure. However the total LA gain was not significant when compared to the total LA gain of the control siblings.[1]

Kirk gives comprehensive case studies of the two subjects given remediation in Hermann's investigation. He concludes that:

---

[1]Barbara Bateman, ITPA in Current Research, pp. 12-13.

1. The increasing similarity between the profiles of the untreated siblings in the fact of apparently decreasing similarities in their environments suggest

   a. a genetic mechanism underlying psycholinguistic abilities, or

   b. a startling amount of interaction among the siblings.

2. The increases shown by the experimental sibling in the areas of remedial training and the equally large increases in other areas by the control siblings who received no remediation suggest the need for precise study of the environmental variables producing or concomitant with such changes.[1]

Kirk has compiled nine discrete case studies representing a variety of psycholinguistic disabilities using the exploratory approach. Many of the children were classified as mentally retarded based on psychometric data and extreme patterns of psycholinguistic disabilities. The remedial procedures were based on behavioral diagnosis and generally were direct remediation of major deficits by individual tutoring. Re-tests show significant gains in deficit areas with the exception of a ten-year-old boy with a severe auditory-vocal channel disability. Audiometric examinations revealed no loss of hearing acuity. He lacked understanding of verbal stimuli resembling that of "receptive dysphasia". After two years of individual remediation, he progressed from a non-reader to reading at his mental age level but there was no significant improvement in his psycholinguistic deficiencies, especially auditory memory which received the greatest emphasis. An eight-year-old girl in special class placement for 17 months showed no perceptible improvement.

---

[1] S. A. Kirk, The Diagnosis and Remediation of Psycholinguistic Disabilities (Urbana, Illinois: Institute for Research on Exceptional Children, University of Illinois, 1966), p. 235.

The results from "pinpointing" her specific disabilities and seven months of clinical-type remediation were significant improvement of disability areas and a notable increase in WISC Performance IQ. A ten-year-old boy with above average IQ could not express himself orally, in writing or in drawing. An intensive programmed instruction (self-paced and self-administered) was used to integrate the manual and verbal expression process. After six months, he gained 3-6 years LA in manual expression and 3-5 years LA in verbal expression. The teacher's evaluation six months after terminating remediation confirmed the stability of improvement. These case studies, confirmed by further research lead to the following generalisations:

1. Some children classified as mentally retarded might more properly be classed as children with learning disabilities though the two classifications are not mutually exclusive.

2. Remediation is effective in ameliorating or modifying some psycholinguistic deficits.

3. Remediation of psycholinguistic deficits appears to have a greater possibility of affecting an increase in IQ in pre-school children than in school age children.

4. Children with psycholinguistic disabilities form a heterogeneous group and appropriate remediation varies from one case to another.[1]

Blessing did an investigation on the effects of direct remediation of a psycholinguistic disability (Verbal Expression) on EMR children. He proposed to determine if remediation in one specific area of disability would tend to elevate over-all language ability. This study was designed to evaluate effects of treatment in terms of immediate and long-term stability of improvement. Forty Madison, Wisconsin, public school special

---

[1] Ibid., p. 71.

class children with a CA range of 8 to 15 years; IQ range of 50 to 80; MA range of 4 to 7 years; were randomly selected for experimental (E) and control (C) groups. They were matched on sex, sibling order, and parental occupation. Subjects were selected who were at least one year below their MA in Verbal Expression as tested on the ITPA, the Vocabulary subtest of the Stanford-Binet and Templin's empirical measures of Total Word Count, Mean Sentence Length and Mean of the Five Longest Remarks. The E children received three one-hour weekly sessions of intensive clinical-type instruction in verbal expressive behavior. Each group was instructed by two different student teachers representing the Mentally Retarded and Speech Correction University programs. The investigator felt this would eliminate biased instructional techniques. All activities and training were under direct supervision of the investigator who stressed attendance to details and transfer of observational habits and principles from lesson to lesson. Four interval evaluations were done using Templin's measures during treatment. The Verbal Expression post-test results of the E children were significantly greater than those of the C group, but the total LA gain was not significantly affected by the specific ability training program. At the beginning of the experiment the subjects' mean verbal expression was six months below MA; at the end the E group exceeded their MA by ten months whereas the C group remained eight months below their MA. Four months after terminating remediation, the E group showed significant gains over C group in long-term retention as measured by Templin's verbal tasks. The Stanford-Binet Vocabulary was not significantly affected by verbal expression gains. Blessing suggests that Stanford-Binet appears to measure recognition and

word meaning rather than verbal usage.[1]

Wiseman did an investigation on specific remediation of EMR boys with similar psycholinguistic disability profiles. Twenty subjects, both resident and day students at the Joseph P. Kennedy School, Palos Park, Illinois, were paired by similarity of disability. The CA, MA and mean LA were also considered. A random selection of ten boys each formed the experimental and control groups. The E group were individually withdrawn from class for sixty 30-minute specific remedial programs. For comparison of progress five pre-test,-post-test were administered; ITPA, Stanford-Binet, Berry-Buktenica's Developmental Form Sequence Test, Frostig's Developmental Test of Visual Perception and the Kass Visual Closure Test. The all-over gains in psycholinguistic abilities made by the E group were significantly superior to the maturational gains made by the C group; particularly when compared in areas that received remediation and in the mean LA. Their performance on the Representational Level subtests seemed to improve at a greater rate than the performance on the Automatic Level. The Automatic Level had significantly more instances of disability than the Representational Level. There were no significant gains between groups in non-disability areas which were not emphasized in remediation. While the disability training did not effect non-disability skills, it did seem to have some effect on other cognitive and perceptual abilities as indicated by mean score gains of the E group exceeding the C group in MA, IQ, visual-motor integration and visual closure. The Frostig scores were not positively affected by

---

[1]K. R. Blessing, "An Investigation of a Psycholinguistic Deficit in Educable Mentally Retarded Children: Detection, Remediation, and Related Variables". (unpublished Doctoral dissertation, University of Wisconsin, 1964).

psycholinguistic training.[1]

Weychert combined the developmental and direct remedial approach to determine the feasibility of using the ITPA for setting up a structured language orientated curriculum for a heterogeneous group of EMR children, (both trainable and educable included). Four special classes from two day schools were tested on the ITPA and the Stanford-Binet. Fifty-two children were equated on the mean LA and MA, IQ, CA and formed the Experimental and Control groups. Disability areas were a consideration in the choice of subjects. The E group teachers had knowledge and use of the ITPA scores while the C group teachers used the Stanford-Binet scores only. A comprehensive program was developed in reading readiness, arithmetic readiness and language development providing an individualised remedial technique--"Color Profile". This technique kept before the teacher and child the specific method and practice most needed thereby cutting down the "hit-and-miss" of a general program and providing a framework for evaluation and re-evaluation. This investigation proposed three questions:

1. Can a classroom teacher of MR children utilise the results of ITPA to set up an effective group language program in a day school setting with a heterogeneous group?

2. To what extent will ITPA profiles be altered as a result of a structured language curriculum?

3. What effect will such a program have on intelligence test performance?[2]

---

[1] Wiseman, Individual Remedial Program

[2] Sister Marie Cornelia Weychert S.S.J., "The Utilisation of the ITPA Profiles to Provide a Structured, Language-orientated Curriculum for MR Children." (unpublished Master's thesis, Cardinal Stritch College, Milwaukee, Wisconsin, 1970).

After a seven-month period of remedial activities the results showed no significant change in the pre-test, post-test profiles of the E group but there was a significant difference between E groups and C groups profiles at the end of the experiment. The E group gains exceeded C group gains in every area. All subjects showed gains in both abilities and disabilities. For both groups the Grammatic Closure and Auditory Memory tests were still the two lowest in mean LA but E group made significant gains in the auditory-vocal channel subtests and particularly in the receptive subtests. There was no significant difference between E and C groups in the Stanford-Binet IQ scores at the end of the experiment.[1]

In summary, these studies show that the direct remedial approach to specific disabilities do in fact successfully remediate "target" disabilities but do not have transfer value to non-disability areas. Remedial programs that stress the combination of general developmental and specific disability remediation do significantly influence all areas of ability. The Automatic Level of psycholinguistic functioning seems to be the most difficult to remediate and shows the least significant gains. The mean total LA and IQ are consistently not significantly influenced by the direct remedial approach.

Studies Utilizing a General or Developmental Remedial Approach

Smith utilized the general remedial approach in an investigation to discover the effects of a language development program upon the psycholinguistic abilities of EMR children. The program aimed at improving

---

[1]Weychert, Utilization of ITPA Profiles, p. 3.

all-over language abilities following Osgood's theoretical language model and has served other researchers as a basic developmental language program. No attempt was made to remediate subjects on the basis of their ITPA profiles. As the investigator was also the remedial instructor, the "Hawthorn" effect was a built-in part of the program. The subjects were EMR children enrolled in the public school special classes; CA ranging 7 to 10 years, Stanford-Binet IQ ranging 50 to 80. Sixteen pairs of children were matched on CA and total LA. Half the children received a 45-minute session three times a week over a perior of eleven weeks. The C children remained in their regular class. At the end of the experiment, the E children had increased their total LA slightly over seven months during a three month treatment period. Thirteen of the sixteen E children showed total LA gains greater than their matched subject. The IQ was not significantly related to the total LA gains and the pre-test LA was not significantly related to the post-test LA gains. The investigator suggests this difference occurred because of the wide range in IQ and CA.[1]

Nine months after the conclusion of Smith's study, a follow-up was done by Mueller and Smith to determine to what extent the LA gains made by E children were stable. At this time there was no longer a significant difference between the E and C groups. Half of the E children still showed an accelerated rate of growth even without a language stimulation program.[2]

---

[1] J. O. Smith, "Effects of a Group Language Development Program Upon the Psycholinguistic Abilities of Educable Mental Retardates", Peabody College Special Education Research Monograph Series, No. 1 (Nashville, Tenn; George Peabody College for Teachers, 1962.)

[2] M. W. Mueller and J. O. Smith, "The Stability of Language Age Modifications Over Time," American Journal of Mental Deficiency, LXVIII (Jan. 1964), pp. 537-539.

Hart proposed to investigate the effects of a developmental language program that particularly emphasized the psycholinguistic disabilities common to a group of cerebral palsied children. The subjects were taken from the School for Spastic Children, Queensland, Australia. Six pairs were matched on CA and total LA and three not so precisely matched pairs were added to increase the group size. There were no significant differences between the E and C groups in mean CA (7-8); mean LA (4-11); mean IQ (about 80). The E group had more severe cases of athetoid and partially-deaf children than the C group. The E group were taken from the regular program for 45-minutes of special instruction over a period of seven weeks. The teachers developed their own curriculum and materials, but the exercises followed Osgood's Communication Model of receptive, associative and expressive processes at the representational level and the automatic level. Particular emphasis was placed on motivation and overlearning. Progress was measured by ITPA, Hull Word Recognition Test, and an arithmetic test. The results indicated a significant gain in the mean total LA of twelve months for the E group as compared to one month gain for the C group. In word reading skills the mean E group gain exceeded the mean C group gain by a difference of six months. Since there was no formal reading instruction in the program, this gain is considered by the investigator to be a significant indirect result of the language program.[1]

Painter demonstrated the effects of a rhythmic and sensory motor

---

[1]Wiseman, "The Effects of an Individual Remedial Program on Mentally Retarded Children with Psycholinguistic Disabilities," pp. 20-21, citing N.W.M. Hart, "The Differential Diagnosis of the Psycholinguistic Abilities of the Cerebral Palsied Child and Effective Remedial Procedures," Special Schools Bulletin, No. 2, Brisbane, Australia, 1963.

activity program on the body image as measured by Goodenough Draw-A-Man Test; perceptual motor integration measured by the Berry-Buktenica Geometric Form Reproductions; and psycholinguistic competence as measured by the ITPA. The subjects were twenty kindergarten public school children who fell in the lower fifty percent of a normal class as determined by the Goodenough MA scores. A control and experimental groups were matched on IQ, CA, MA, and sex. The program consisted of systematically sequenced activities using the theoretical constructs suggested by Barsch and Kephart. Gross and fine motor activities were presented in nine movement areas. An extensive description of these exercises is given in the appendices of Painter's thesis.[1] The E group gains were superior to the C group gains on all post-tests. As a result of the activities involving movement of total body parts, the E group had significantly fewer distortions in their drawings of the human figure. The E group had mean gains of twenty-seven months in Manual Expression and twelve months in Auditory Association as compared to the mean gains of the C group three months and almost three months respectively. The increase in Auditory Association suggests an increase in the general performance level of E group as this test correlates highly with the Stanford-Binet MA.[2]

Karnes, Teska and Hodgins did an investigation designed to evaluate

---

[1]Genevieve B. Painter, "The Effect of a Rhythmic and Sensory-Motor Activity Program on Perceptual-Motor-Spatial Abilities of Kindergarten Children," (unpublished Master's thesis, University of Illinois, 1964).

[2]Painter, "Ibid." Exceptional Children, XXXIII (October, 1966), pp. 113-116.

the differential effects of four pre-school intervention programs for disadvantaged children determined by pre and post-test results on the ITPA, Stanford-Binet and Peabody Picture Vocabulary Test. The four programs are described as follows:

1. The traditional nursery school program promoted the personal, social motor and general language development of the child in informal learning activities.
2. The Community-Integrated program followed a traditional nursery school program but the advantaged peers were to provide a language model for the language inadequacies of the disadvantaged.
3. A Montessori program in which the child learns from using materials presented in the "prepared environment".
4. The experimental program using the pre-test performance, particularly the ITPA, provided a structured program in basic concepts and specific learning tasks.

Sixty disadvantaged children from an economically depressed area were divided into four classes of fifteen subjects each. Subjects had a mean CA range of 49 to 52 months and a mean IQ of 95 with no previous pre-school experience. Strategies were used to maintain a balanced range of IQ, sex and race. Each class was randomly assigned to a particular program. There was no significant differences among the four groups at the outset of the experiment.

> The most important finding of this study: the Experimental program had a positive effect on the IQ score of every child in the group.....
> .....
> Structure predicates active involvement of teacher and child
> .....

> The teacher in this setting monitored the child's manipulative performances and assessed the adequacy of his verbal responses so that she could alter the learning situation appropriately... In the other three programs a variety of learning experiences were made available to the children, but their involvement in specific experiences were not required and concurrent verbal responses were not insisted upon. Individual children in the other three programs did indeed make gains greater than the highest gain made by any child in the Experimental program. However, the number of children who made excellent gains was overshadowed by the percentage who made minimal gains and regressions.[1]

On the ITPA pre-test all the subjects had large initial deficits in Verbal Expression, Grammatic Closure and Auditory Association. The Experimental group made significant gains in all three tests eliminating completely its deficits. There was no significant difference in performance of all four groups on Manual Expression. The Traditional group made modest gains on all instruments but the gains in Verbal Expression, Visual Memory and Auditory Reception were significantly greater on the ITPA post-test. The Community-Integrated group had small and inconsistent gains. This program was not effective in promoting vocabulary comprehension as tested by PPVT.

> The disadvantaged children in the Community Integrated program, failed to incorporate the language model of their advantaged peers because they did not reciprocate in verbal interactions at any significant level. They not only failed to interact verbally in peer-initiated play situations but tended to withdraw from quasi-structured, teacher-directed activities and thus sharply limited the progress they were to make.[2]

The Montessori program showed the least progress. In no instance was the post-test significantly higher than the pre-test and there was a significant

---

[1] M. B. Karnes, J. A. Teska, and Audrey S. Hodgins, "The Effects of Four Programs of Classroom Intervention on the Intellectual and Language Development of 4-Year-Old Disadvantaged Children," American Journal of Orthopsychiatry, XL (January, 1970), p. 65.

[2] Ibid., p. 76.

regression in Grammatic Closure and near significant regression in both memory tests. The Montessori program focused on sensory-motor learning and an absence of verbal language characterized their classroom. "Structured emphasis on motor-sensory development without similar concern for the verbal development programmatically moves in the wrong direction for the disadvantaged child."[1]

In summary, these studies demonstrate that a developmental program of remediation yields an increase in mean total LA. The stability of improvement depends on the period and type of remediation as well as the chronological age of the subjects. The IQ is not significantly affected by the mean total LA gains. However an improvement in general performance (i.e. reading, visual-motor and language skills) is significant for individual subjects.

---

[1] Ibid., p. 75.

CHAPTER III

SUMMARY AND CONCLUSIONS

In this paper, learning disabilities, as a behavioral and educational concept, refers to the developmental discrepancies in the communication processes; i.e. the psycholinguistic functioning of children related to language, perception, speech and reading.

A diagnostic instrument was required to identify specific psycholinguistic abilities and to differentiate disabilities. The ITPA, as such a tool, analyses children's psycholinguistic abilities, in the receptive, associative and expressive processes of communication; through the auditory and visual channels dealing with receptive language--vocal and motor channels for expressive communication; at two levels of organization, i.e. meaningful and non-meaningful language. The resulting pattern of specific psycholinguistic disabilities as expressed in the ITPA profile, provides the basis for educational planning of specific remedial procedures and techniques.

The ITPA when used with preschool and primary children is geared more towards prevention than remediation of psycholinguistic disabilities. In preschool children, disability areas are primarily in the behavioral and the communication processes. Their profiles are not as diagnostic of specific abilities. Their deficits are easier to remediate and frequently result in IQ gains. With school-age children the learning disabilities are more discrete, and less easy to ameliorate. Remediation seldom

affects their IQ and there is a wider discrepancy between LA, MA and CA.

Qualitative and Predictive Differences

The research reviewed in this study reveals characteristic patterns in ITPA profiles which lead to some generalisations based on qualitative differences in performance.

Children, regardless of exceptionality, generally score lower at the automatic level than at the representational level. It appears to be more difficult to organise and integrate automatic, habitual or rote aspects of language than to deal with symbols that represent meaningful concepts. Skills at the automatic level are most difficult to remediate and they show the least significant gains.

The IQ generally reflects auditory and vocal abilities. Children of high intellectual ability show a preference for the auditory and vocal channels and a strength in the associative process. The difference between the MA and the LA appears to increase as the IQ decreases. The presence of a strong general language factor is reflected in the high correlations between MA and total LA.

Children of lower intellectual ability perform better in the visual and motor channels, particularly in Manual Expression and Visual Reception. Heredity studies report that the visual and motor channels tend to have a higher genetic factor than the auditory and vocal channels. Mentally retarded children usually show a preference for the visual-motor channels at the representational level. The Down's Syndrome child frequently has a peak in Manual Expression. Institutionalised mentally retarded children have similar patterns of performance.

The auditory and vocal channels seem to be more affected by social class especially where environmental deprivation is involved. The characteristic features of the culturally deprived are relative strengths in the visual-motor subtests with significant deficit in the Grammatic Closure subtest. Culturally deprived Negro Children frequently show a peak performance in Auditory Memory, which may be supported by a strength in Visual Association. Cultural aspects are reflected in isolated subtests as was the case in the Visual Memory strength of the Papago Indians.[1]

Girls seem to be superior to boys in general languageability, particularly in the association and memory processes. Boys have more variability between subtests but frequently perform slightly higher than girls in the receptive and expressive processes.

These generalisations are ascertained from research studies representing total group scores and are not necessarily applicable when interpreting the individual profile.

The ITPA has been an effective tool in differentiating some groups of children with auditory and visual handicaps and in predicting reading disabilities and speech disorders. Sensory impairment does not necessarily impair other psycholinguistic processes. The hard of hearing child surpassed the receptive aphasic child in total languageability. The visual-motor performance of partially-sighted children with mild or moderate visual handicaps was not significantly inferior to their auditory-vocal abilities. These findings suggest that the ITPA measured central rather than peripheral processes and that mild visual defects do not affect the scores on ITPA subtests using the visual modality.

---

[1] T. P. Lombardi, Psycholinguistic Abilities of Papago Indians, pp. 485-493.

Several studies have shown that a close relationship exists between reading disability and the skills at the automatic level, i.e. closure, memory and sound blending. The results of reading studies generally indicated that poor readers have severe deficits in the auditory and vocal subtests at the automatic level. Their performance is inferior in tasks that involve memory, the automatic use of verbal symbols and those directly related to school achievement. Poor readers have exhibited strengths in Visual Reception and Manual Expression. They have a general ability to solve problems through compensatory skills using visual materials and the manipulation of objects.

Reading is basically a sound-symbol association process. Grammatic Closure, Visual Association, and Visual Memory are positive correlates of reading achievement. Good readers show a preference for the auditory modality while poor readers generally have their strength in the visual modality with the exception of Graubard's group of emotionally disturbed poor readers whose strength was in the auditory modality.[1]

The question of whether to teach to the child's psycholinguistic pattern of strengths or to the weaknesses is a relevant one. The auditory method has proven superior regardless of the child's learning pattern. Bateman found there is little interaction between preferred modality and method but as a rule recommends one teach to the strength if the child is an auditory learner and remediate the auditory deficit if the child is a visual learner.[2] One may conclude that the best approach would be

---

[1]P. S. Graubard, "Reading Disability in Disturbed Children", p. 80.

[2]Barbara Bateman, "Efficacy of an Auditory and Visual Method", p. 111.

a combination of auditory and visual techniques subject to the child's individual learning pattern.

Verbal language ability seems to facilitate visual memory ability. Delayed speech development appears to be a phenomenon among severely disabled readers.

Effects of Remediation

Remedial treatment studies are hindered by multiple uncontrolled variables. When educational gains are effected by a given procedure, it is difficult to know what factors were operating in producing the gains. Was it solely the method or a combination of increased individual attention, reduced parental anxiety and a different learning set?

The methods that appear to be most effective are prescriptive in nature, i.e. specific techniques applied to specific deficits. Most research using the direct remedial approach has made significant gains in deficit area but has not significantly influenced the total language age nor the IQ. This seems to suggest that "target" remediation has little transfer value in non-disability areas. The transfer of improved basic abilities has been successfully accomplished in studies that thoroughly trained the deficit area and simultaneously reinforced that training through the intact areas.

Long-term retention is an important element of "target" remediation. Findings suggest that longer periods of training are necessary to obtain permanent gains from remediation.

Ancillary benefits have resulted from the general or developmental remedial approach. Reading gains were an indirect result of a developmental language program. A sensory-motor activity program resulted in

total LA gains and an increase in general achievement.

Early identification and remediation of language deficiencies have resulted in mean total LA gains and an increase in MA. Remedial methods, wherein the teacher elicits from the child verbalisations tied to sensory-motor performance have been most successful with the disadvantaged preschool child.

Educational Implications

Since sensory impairment does not necessarily limit process functioning, it may be concluded that the method or the modality are less important in remediation than the actual and extensive manipulation of symbols, concepts, or words at the automatic level.

Remediation appears to be more effective through the highly structured academically orientated learning tasks. Extensive programmed instruction at the automatic level should be requisite of any remedial program.

A developmental language program should supplement the reading readiness program, especially with disadvantaged children. The time factor is an important consideration in planning remediation. General developmental language programs are more effective with mentally retarded children than are speech therapy program.

Future Research

Future research is needed to determine:

1. The relationship between the communication process at the automatic level and the acquisition of reading skills.
2. The most efficient methods for training and integrating abilities at the automatic level.

3. The efficacy of different types of remedial approaches; i.e. developmental programs, task analysis, "crash" programs treating all disability areas, and group or tutorial programs.
4. The permanency of the treatment gains made in psycholinguistic abilities.
5. The crucial age for beginning remedial programs.
6. The effects of group size, group CA, and length of treatment time on the LA gains in a remedial program.
7. To what extent Grammatic Closure and Auditory Association are related disabilities as they affect disabled readers.
8. What psychological correlates influence psycholinguistic performance on the ITPA among delinquent, disturbed, institutionalised, and disadvantaged children.
9. The conditions necessary for the transfer of training from specific psycholinguistic abilities to academic achievement, communication, interpersonal relationships and vocational success.

The ITPA as a diagnostic test has been developed to identify disabilities which can be ameliorated through systematic remedial programs. The research selected for this paper represents a body of information which will hopefully contribute to the more intelligent use and interpretation of the ITPA for the purpose of diagnosis and remediation.

BIBLIOGRAPHY

Books

Bateman, Barbara D. Interpretations of the 1961 Illinois Test of Psycholinguistic Abilities. Seattle, Washington: Special Child Publication, 1968.

Berko, Jean and Brown, R. "Psycholinguistic Research Methods", Handbook of Research Methods in Child Development. ed. by P. Mussen, New York: John Wiley & Sons, 1960.

Berry, Keith E. Remedialdiagnosis. San Rafael, California: Dimensions Publishing Co., 1968.

DeCecco, John P. The Psychology of Learning and Instruction. Englewood Cliffs, New Jersey: Prentice-Hall, 1968.

DeHirsch, Katrina, Jansky, Jeannette, and Langford, W.S. Predicting Reading Failures. New York: Harper Row, 1966.

Engelmann, S. Preventing Failure in the Primary Grades. Chicago: Science Research Associates, 1969.

Gillingham, Anna and Stillman, Bessie. Remedial Training for Children With Specific Learning Disabilities in Reading, Spelling and Penmanship. Cambridge, Massachusetts: Educator's Publishing Service, Inc. 1960.

Johnson, D.J. and Mykelbust, H.R. Learning Disabilities: Educational Principles and Practices. New York: Grune and Stratten, Inc. 1967.

Kirk, S.A. ITPA, It's Origins and Implications, Learning Disorders. Vol. III, ed. by J. Hellmuth. Seattle: Special Child Publication, 1968.

Lawrence, P.J. Prescriptive Teaching. New York: McGraw Hill Book Co., 1965.

Mager, Robert. Preparing Instructional Objectives. Palo Alto, California: Fearon Publishing Co., 1962.

_____. Developing Attitudes Toward Learning. Palo Alto, California: 1968.

McCarthy, James J. and McCarthy, Jean F. Learning Disabilities. Boston: Allyn and Bacon, Inc., 1969.

Meeker, Mary N. The Structure of Intellect. Columbus, Ohio: Charles Merrill, 1969.

Osgood, Charles E. Contemporary Approaches to Cognition, A Behavioristic Analysis. Cambridge: Harvard University Press, 1957.

Paraskevopoulos, John and Kirk, S.A. The Development and Psychometric Characteristics of the Revised Illinois Test of Psycholinguistic Abilities. Urbana: University of Illinois Press, 1969.

Piaget, Jean. The Origins of Intelligence in Children. New York: W.W. Norton, 1963.

Strang, Ruth. Diagnostic Teaching of Reading. New York: McGraw Hill, 1964.

Valett, Robert E. Programming Learning Disabilities. Palo Alto, California: Fearon Publishers, 1969.

Articles and Periodicals

Banas, Norma and Wills, I.H. "The Vulnerable Child and Prescriptive Teaching", Academic Therapy. Spring, 1969.

_____. "The Vulnerable Child: Is He Equipped for School Achievement?," Academic Therapy. Winter, 1969.

Bannatyne, Alex. "Diagnostic and Remedial Techniques for Use with Dyslexic Children," Academic Therapy. Summer, 1968.

Bateman, Barbara. "Learning Disabilities--Yesterday, Today and Tomorrow," Exceptional Children. XXXI December, 1964.

Bilovsky, D. and Share, J. "ITPA and Down's Syndrome: An Exploratory Study," American Journal of Mental Deficiency. LXX. July, 1965.

Bruininks, R.H., Lucker, W.G. and Gropper, R.L. "Psycholinguistic Abilities of Good and Poor Reading Disadvantaged First Graders," Elementary School Journal. LXX. April, 1970.

Early, G.H. and Sharpe, T.M. "Developing Perceptual-Motor Skills," Academic Therapy. Spring, 1970.

Ensminger, E.E. and Smith, J.O. "Language Development and the ITPA," Training School Bulletin. LXII. 1965.

Glovsky, L. "A Comparison of Two Groups of Mentally Retarded Children on the ITPA," Training School Bulletin. May, 1970.

Haring, N.G. and Ridgway, R.W. "Early Identification of Children with Learning Disabilities," Exceptional Children. February, 1967.

Hart, N.W. "The Differential Diagnosis of the Psycholinguistic Abilities of C.P. Children and Effective Remedial Procedures," Special School Bulletin. II. Brisbane, Australia: 1963.

Hirsheren, A. "A Comparison of the Predictive Validity of the Revised Stanford-Binet Intelligence Scale and the ITPA," Exceptional Children. January, 1970.

Horner, R.D. "A Factor Analysis Comparison of the ITPA and PLS with Mentally Retarded Children," Exceptional Children. November, 1967.

Hubschman, Eva, Peliszette, Anna and Kaliski, Myra. "Performance of Institutionalised Retardates on the PPVT and Two Editions of the ITPA," American Journal of Mental Deficiency. January, 1970.

Hurley, O.L. "Perceptual Integration and Reading Problems," Exceptional Children. November, 1968.

Joynt, D. and Cambourne, B. "Psycholinguistic Development and the Control of Behavior: Replication of A.R. Lurias' Study," British Journal of Educational Psychology. November, 1968.

Karnes, M.B., Teska, J.A. and Hodgins, Audrey. "The Effects of Four Programs of Classroom Intervention on the Intellectual and Language Development of Four-Year-Old Disadvantaged Children," American Journal of Orthopsychiatry. January, 1970.

Kass, Corrine E. "Learning Disabilities," Review of Educational Research. February, 1969.

Kerman, J.S. "Iatrogenic Learning Disabilities," Academic Therapy. Summer, 1970.

Kirk, S.A. and Bateman, Barbara. "Diagnosis and Remediation of Learning Disabilities," Exceptional Children. October,1962.

Kirk, S.A. and McCarthy, J.J. "The ITPA--An Approach to Differential Diagnosis," American Journal of Mental Deficiency. November, 1961.

Lombardi, T.P. "Psycholinguistic Abilities of Papago Indian School Children," Exceptional Children. March, 1970.

Lovitt, T.C. "Assessment of Children with Learning Disabilities," Exceptional Children. December, 1967.

Mann, L. "Are We Fractionating Too Much?," Academic Therapy. Winter, 1969-70.

_____. "Perceptual Training: Misdirections and Redirections," American Journal of Orthopsychiatry. January, 1970.

McLeod, J. "Some Psychological Correlates of Reading Disability in Young Children," Reading Research Quarterly. II, 1967.

Meyers, C.E. "What ITPA Measures: A Synthesis of Factor Studies of the 1961 Edition," Educational and Psychological Measurements. Winter, 1969.

Mittler, P. "Genetic Aspects of Psycholinguistic Abilities," Journal of Child Psychology and Psychiatry. X, 1969.

Mittler, P. and Ward, J. "Use of the ITPA on British Four-Year-Old Children: A Normative and Factorial Study," British Journal of Educational Psychology. XL, 1970.

Mueller, M.W. "Comparison of Psycholinguistic Patterns of Gifted and Retarded Children," Journal of School Psychology. Spring, 1965.

Mueller, M.W. and Smith, J.O. "The Stability of Language Age Modifications Over Time," American Journal of Mental Deficiency. January, 1964.

Mueller, M.W. and Weaver, J.S. "Psycholinguistic Abilities of Institutionalised and Non-Institutionalised Trainable Mental Retardates," American Journal of Mental Deficiency. LXVIII, 1964.

Paraskevopoulos, J.N. and McCarthy, J.J. "Behavior Patterns of Children with Special Learning Disabilities," Psychology in the School. January, 1970.

Quereshi, M.Y. "Patterns of Psycholinguistic Development During Early and Middle Childhood," Educational and Psychological Measurements. Summer, 1967.

Ross, A.O. "Learning Difficulties of Children: Dsyfunction, Disorders, Disabilities," Journal of School Psychology. V, 1967.

Ryckman, D.B. and Wiegerink, R. "The Factors of the ITPA: A Comparison of 18 Factor Analyses," Exceptional Children. October, 1969.

Schiller, J.J. and Deignan, Margaret. "An Approach to Diagnosis and Remediation of Learning Disabilities," Journal of Learning Disabilities. October, 1969.

Serio, Martha. "Know the Child to Teach the Child," Academic Therapy. Spring, 1970.

Weaver, S.J. and Weaver, Ann. "Psycholinguistic Abilities of Culturally Deprived Negro Children," American Journal of Mental Deficiency. July, 1967.

Weener, P., Barritt, L.S. and Semmel, M.I. "A Critical Evaluation of the ITPA", Exceptional Children. February, 1967.

Wiseman, D.E. "The Effects of an Individual Remedial Program on Mentally Retarded Children with Psycholinguistic Disabilities," Special School Bulletin. II, 1963.

_____. "Remedial Education: Global or Learning Disability Approach?", Academic Therapy. Spring, 1970.

Wisland, M.V. and Many, W. "Study of the Stability of the ITPA," Educational and Psychological Measurements. Summer, 1967.

Unpublished Materials

Bateman, Barbara. The ITPA in Current Research. Institute of Research on Exceptional Children, University of Illinois, Urbana: 1965.

_____. "Reading and Psycholinguistic Processes of Partially-Sighted Children." Unpublished Ph.D. dissertation, University of Illinois, 1962.

Blessing, K.R. "An Investigation of a Psycholinguistic Deficit in Educable Mentally Retarded Children: Detection, Remediation, and Related Variables." Unpublished Ph. D. dissertation, University of Wisconsin, 1964.

Graubard, P.S. "Psycholinguistic Correlates of Reading Disability in Disturbed Children." Unpublished Ph. D. dissertation, Yeshiva University, 1965.

Herman, Anita. "An Experimental Approach to the Educability of Psycholinguistic Function in Children." Unpublished Master's thesis, University of Illinois, 1962.

Kass, Corrine E. "Some Psychological Correlates of Severe Reading Disability (Dyslexia)." Unpublished Ph. D. dissertation, University of Illinois, 1962.

McCarthy, J.J. "The Use and Usefulness of the ITPA," Inspection and Introspection of Special Education. Selected Convention Papers, Forty-second Annual Council for Exceptional Children, Chicago, Illinois: March, 1964.

Olson, J.L. "A Comparison of Receptive Aphasic, Expressive Aphasic and Deaf Children on the ITPA." Selected Studies on the ITPA. Institute for Research on Exceptional Children at the University of Illinois, 1963.

Painter, Genevieve. "The Effects of a Rhythmic and Sensory-Motor Activity Program on Perceptual-Motor Spatial Abilities of Kindergarten Children." Unpublished Master's thesis, University of Illinois, 1964.

Ragland, G.G. "The Performance of Educable Mentally Handicapped Students of Differing Reading Ability on the ITPA." Unpublished Ph.D. dissertation, University of Virginia, 1964.

Weyehert, Sister Marie Cornelia, S.S.J. "The Utilization of the ITPA Profiles to Provide a Structured, Language-orientated Curriculum for MR Children." Unpublished Master's thesis, Cardinal Stritch College, Milwaukee, Wisconsin, 1970.

Wiseman, D.E. "The Effects of an Individual Remedial Program on Mentally Retarded Children with Psycholinguistic Disabilities." Unpublished Ph.D. dissertation, University of Illinois, 1965.

Monographs

Bateman, Barbara. "The Coded Deviation Profile (ITPA)--An Application of Mean Language Age to Profile Analysis." Unpublished material, Institute of Research for Exceptional Children, University of Illinois, 1963.

_____. "The Efficacy of an Auditory and Visual Method of First Grade Reading Instruction with Auditory and Visual Learners," Perceptions in Reading. Proceedings of the Twelfth Annual Convention, International Reading Association, Newark, Delaware: 1969.

Kirk, S.A. The Diagnosis and Remediation of Psycholinguistic Disabilities. Institute for Research on Exceptional Children, University of Illinois, 1966.

Slobodsian, Evelyn. "Use of the ITPA as a Readiness Measure," Reading Diagnosis and Evaluation. Proceedings of the Thirteenth Annual Convention International Reading Association, Newark, Delaware: 1970.

Smith, J.O. "Effects of a Group Language Development Program Upon the Psycholinguistic Abilities of Educable Mental Retardates," Peabody College Special Education Research Monograph Series. Nashville, Tenn: 1962.

Tests

Engelmann, S. Basic Concept Inventory. Chicago: Follett, 1967.

Roach, E.G. and Kephart, N.C. Purdue Perceptual-Motor Survey. Columbus, Ohio: Charles Merrill Book Co., 1966.

Wepman, J.M. Auditory Discrimination Test. Chicago: Language Research Associates, 1958.